

THE EASTERN PACIFIC HURRICANE SEASON OF 1969

ROBERT A. BAUM

Eastern Pacific Hurricane Center, ESSA, Weather Bureau, San Francisco, Calif.

ABSTRACT

A résumé of the 1969 tropical cyclone season of the eastern North Pacific Ocean is presented. A comparison between aircraft reconnaissance and satellite wind-speed estimates is made with limited data. The presentation is a chronicle of individual tropical storms and hurricanes during 1969, including satellite pictures and near-synoptic post-reconnaissance debriefings.

1. SEASONAL RÉSUMÉ

The eastern North Pacific tropical cyclone season of 1969 began on May 30 with a short-lived tropical depression. It was early July before a tropical storm developed, and the season then continued through mid-October when Jennifer moved inland northwest of Mazatlan, Mexico.

There were six tropical storms (sustained winds of 34 to 63 kt), four hurricanes, and five tropical depressions. The number of disturbances, though agreeing with Rosenthal (1962), is believed less than normal. The number is about half that expected by Sadler (1963) and somewhat less than suggested as normal by Denney (1969). It is not far from the average for the last decade (table 1), 7.3 tropical storms and 3.5 hurricanes per year.

Satellite observations began in 1962 and have increased in coverage and numbers annually, providing better reconnaissance of the area each year. Subsynchronous disturbances with high winds and low pressures were reported by vessels; but as no organized circulation could be found with them, they were not included. Table 2 shows the seasonal distribution of tropical cyclones, and table 3 indicates the number of storm days.

TABLE 1.—Annual frequency of tropical cyclones, 1960–1969, in the eastern North Pacific (east of longitude 140° W.)

	1960	61	62	63	64	65	66	67	68	69	Total
Tropical storm winds 34–63 kt	3	9	6	4	5	9	7	11	13	6	73
Hurricane	5	2	2	2	1	1	6	6	6	4	35

TABLE 2.—Monthly frequency of tropical cyclones in the eastern North Pacific Ocean in 1969

	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
T/D	1	1	0	1	0	2	0	5
T/S	0	0	2	1	3	0	0	6
Hurricane	0	0	1	1	1	1	0	4
Total	1	1	3	3	4	3	0	15

TABLE 3.—Number of tropical cyclone days in the eastern North Pacific Ocean in 1969

	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
T/D	2	5	9	7	9	7	0	39
T/S	0	0	11	6	15	3	0	35
Hurricane	0	0	3	2	1	3	0	9
Total	2	5	23	15	25	13	0	83

Two storm days were counted each day when two storms were in progress.) A total of 25 advisories were issued for hurricanes, 106 for tropical storms, and 93 bulletins for tropical depressions. Storm tracks shown in figure 1 are the most reasonable developed in post-storm analysis. Considerable smoothing has been applied between satellite fixes during periods of sparse observational data. For locations of storms, aircraft reconnaissance agreed with the satellite pictures.

Lack of observational data during the night made the relocation of storms necessary—twice during the life of Ava and once each in Bernice, Heather, and Irah. In other cases, a newly observed position lay within the previously indicated position accuracy, and no relocation was indicated.

2. STORM EFFECTS

Jennifer was the only storm reported to have caused damage from high wind and heavy rain. One person was killed and 15 injured in Mazatlan on Oct. 12, 1969. The ferry that plies between La Paz and Mazatlan was swamped in the Mazatlan Harbor, as were 12 shrimp boats. The ferry was restored to service after a short period. More than 30 other shrimp boats of unknown displacement were reported lost in smaller harbors along the coast. Extensive property damage was reported along a 100-mi section of coast, but no peso amounts have been indicated.

Jennifer was estimated to have moved onshore about 40 mi northwest of Mazatlan. Hourly aviation weather reports from Mazatlan as the storm moved inland were:

1600Z E23@80@20 24/21 0718/065 NUBES MAS BAJAS NORTE 72X39,
 1700Z E20@10 24/23 0916MAS20/051 CLCDO NUBES VIS MAS ATLAS,
 1800Z P6@1R MAS 24/24 0920MAS40/050 7XXX9,
 1900Z W3@1RW 24/24 0940MAS56/101 7XXX9,
 2000Z MISG,
 2100Z W1@L 20/20 1550MAS70/996 7XXX9,
 2200Z W1@1RW 20/20 2040MAS60/959 CONDS VAR 7XXX9,
 2300Z W2@1R MAS 20/20 2226/045 CONDS VAR 7XXX9, and
 0000Z W5@11/2R MAS 20/20 2414/ CONDS VAR 7XXX9.

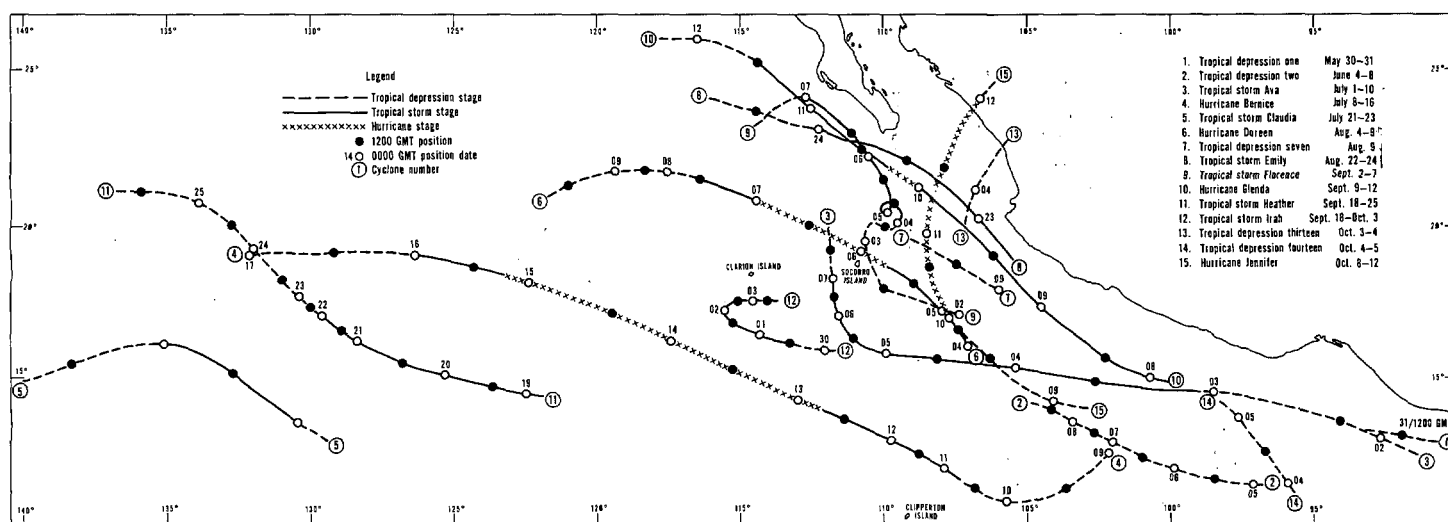


FIGURE 1.—Tropical cyclones in the eastern North Pacific Ocean in 1969.

The highest wind speed reported by a ship was 58 kt in Doreen at 1800 GMT on August 5, when satellite pictures indicated a maximum of 75 kt. The ship was a short distance north of the center. No report of damage to shipping while on the high seas has been received.

3. USE OF BASIC DATA

The basic data came from the following sources: surface synoptic and upper air reports, reconnaissance aircraft, satellites, ship reports, and inflight reports from commercial aircraft.

Surface synoptic and upper air data continue to be sparse. Upper air data are nonexistent, except for occasional wind reports from Mazatlan, and surface data have become even more sparse in the past year. U.S. Air Force and U.S. Navy reconnaissance aircraft flew whenever storms were within range, the Air Force penetrating the centers at 300 mb and the Navy at about 1,500 ft. The Air Force flew a total of 18 missions, generally intercepting the storm at 1800 GMT; the Navy flew 12 missions, mostly intercepting the storm at 0000 GMT. On six occasions, reconnaissance was accomplished twice a day. Navy aircraft restaged at Acapulco several times in 1969, flying from Point Mugu to the storm and on to Acapulco one day, then returning to Point Mugu via the storm the next day. Florence was the best documented storm by reconnaissance with seven flights in the period of September 3-6.

The most frequent storm fixes were obtained on the 1800 GMT map analysis from APT ESSA 8. Nimbus supplemented ESSA 8 when geography was available to fix a grid to the picture. ESSA 8 pictures on July 12, 1969, showed Bernice on the left edge of figure 2B and on the right edge of the next pass (fig. 2A). Nimbus 3, also on July 12, located the storm in the bottom part of figure 2C and gave a fair location and a better indication of intensity. These pictures were timely and could be used in the 2100 GMT advisory. Gridded mosaics available from the facsimile circuit could not be included in the 0300 GMT

advisory, but were used to provide continuity of movement on the 0000 GMT synoptic chart.

The general guidelines established for the intensity of a storm by Timchalk et al. (1965) were followed during the season. Maximum winds in a storm are difficult to verify due to the infrequent low-level reconnaissance by aircraft and to the paucity of ship reports. Of the 28 reconnaissance flights, 15 reported surface wind estimates. This is a small sample from which to draw conclusions, but indications are that the reconnaissance wind estimates were lower than those from the Timchalk method. San Francisco bulletins normally fell between the reconnaissance wind estimate and that of the NESC, largely because of local interpretation of APT pictures and the availability of reconnaissance observations. NESC data were not synoptic in most cases, presenting a comparison problem. Intensity indications shown by the three sources are presented in figure 3.

Wind direction and speed were obtained by NESC from ATS I satellite pictures during hurricane Bernice and tropical storm Heather. Winds and satellite pictures were not synoptic, but illustrate the anticyclonic circulation of the cirrus cloud shield. The winds over Bernice were plotted on a gridded ESSA 9 picture shown in figure 4.

An excerpt from the San Francisco Tropical Storm Log, 1969, reads, "Sept. 28, 2100Z. Mr. Oliver called 1915Z saying a satellite bulletin CAT 2 DIA 3 13.5N 122.5W was being issued. He elaborated that time lapse sequences (ATS I) had shown a doubling of wind speed during past 24 hours and an increasing tendency during the 24 hours before that."

Ship observations were very sparse this year, especially at 0600 and 1200 GMT, possibly due to the reduction in the number of radio operators on board merchant vessels. Where one operator is available on a ship, radio coverage is limited to 8 hr in 24, divided as shown in figure 5 (U.S. Coast Guard 1969). Though observations are taken at synoptic times, a single radio operator is on duty to

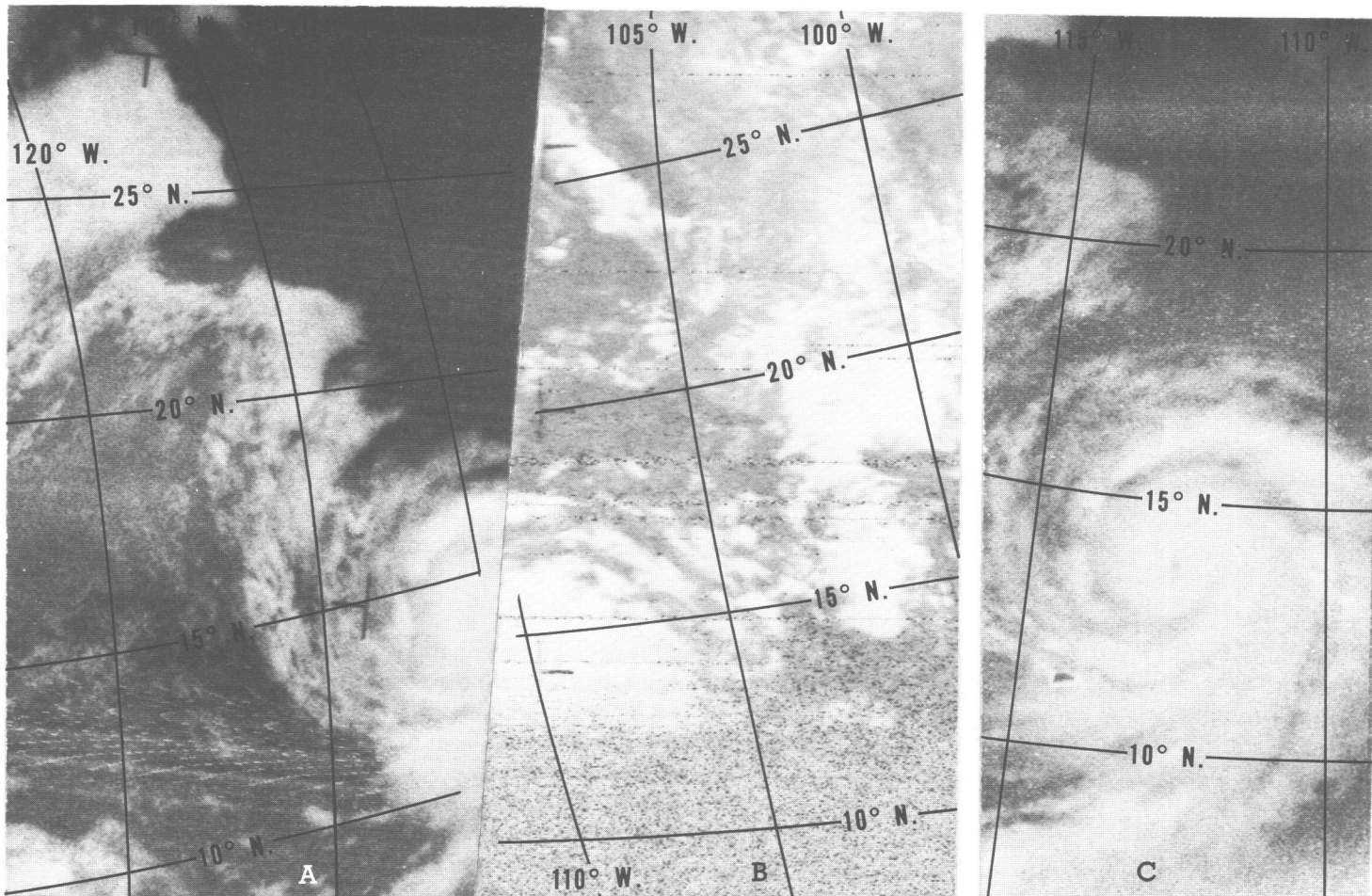


FIGURE 2.—Satellite views of hurricane Bernice on July 12, 1969. (A) ESSA 8, Orbit 2624, 1746 GMT; (B) ESSA 8, Orbit 2623, 1551 GMT (C) Nimbus III, 1921 GMT.

transmit them only at 0000 GMT in the eastern North Pacific Ocean. Vessels with two operators cover the 0000, 1200, and 1800 GMT synoptic periods in this area. A number of special observations were sent during the period when "special observations at 3-hr intervals" were requested. These reports came from vessels of virtually all registry.

Inflight reports from aircraft flying between Los Angeles (or Mexico City) and South Pacific islands were frequent, but very little information on hurricane location or movement was received.

4. SUBSYNOPTIC DISTURBANCES

Numerous reports of small-scale disturbances were received during the season. Thunderstorms with heavy rain were reported occasionally in ship reports off the Mexican coast.

The most spectacular sighting probably occurred on October 4 about 200 mi southwest of Ixtepec, Mexico, near the Gulf of Tehuantepec. What appeared to be a tornado hook was viewed on a radarscope by Capt. Dyer (1970) aboard the SS *Inger*. A copy of the radarscope picture is compared with a typical tornado echo (insert

plus WB Radar Manual Fig. 15-3) in figure 6.

At 1800 GMT on July 1, six waterspouts were reported in the previous 2 hr by the MV *Charles Lykes* at 15.5° N., 97.5° W., while the cloud mass associated with what was to become tropical storm Ava was near 13.5° N., 91.0° W., in ESSA 9, Pass 1566 (fig. 7).

On September 29 at 0034 GMT, a message from the *Golar Nel* read: "Passed tropical depression position N16.40 W101.00 GMT2230 barometer 999 wind force 40." At 150 mi northwest of the *Golar Nel*, the SS *Arizpa* encountered a sharp pressure change at 0730 GMT (fig. 8). No special observations were taken during the pressure changes in which winds should have reached 60 kt (Fletcher 1955).

While small circulations could be forced on the surface charts for these data, satellite pictures before and after the occurrence did not indicate closed circulations in the area.

5. ANALYSIS OF INDIVIDUAL TROPICAL CYCLONES

TROPICAL STORM AVA, JULY 1-7

A bright cloud mass on the 1923 GMT ESSA 8 satellite picture on June 30 off the Guatemalan coast moved

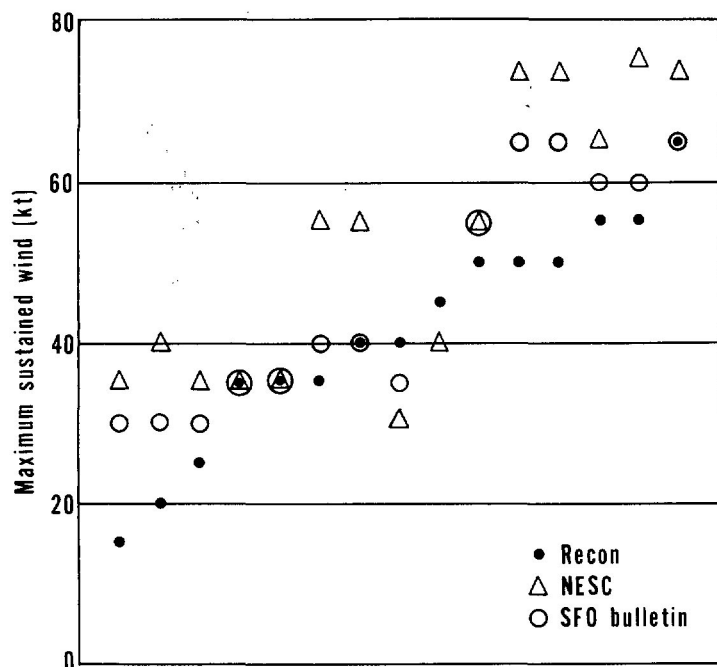


FIGURE 3.—Comparisons between aircraft reconnaissance, NESC, and San Francisco bulletin wind speeds. (The cases are arranged in order of increasing reconnaissance winds.)

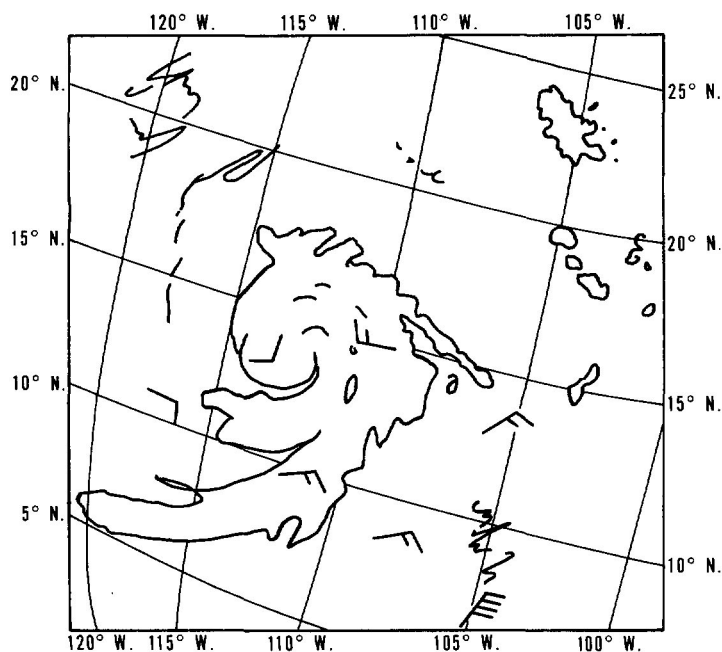


FIGURE 4.—Satellite-derived winds from ATS I over hurricane Bernice on July 12, 1969.

northwest and developed a closed circulation between 1200 GMT and 1800 GMT on July 1. Further development to tropical storm intensity occurred by 0200 GMT on the 2d as indicated by a northeast 40-kt wind reported by the MV *Columbia* (KGYS). At 1125 GMT on the 2d, the MV *Charles Lykes* (KEBX) passed through the center, at 13.5° N., 94.1° W., with a sharp wind shift and a rapidly

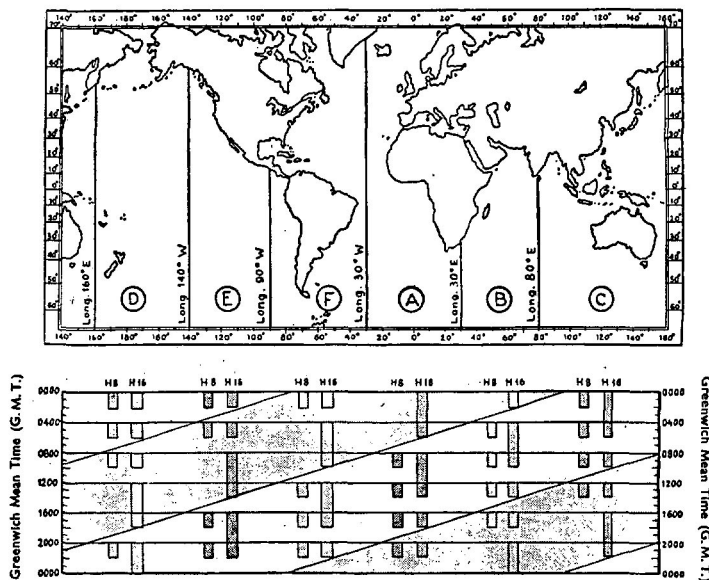


FIGURE 5.—Hours of duty of ships' radio operators, 8- and 16-hr coverage (from U.S. Coast Guard 1969).

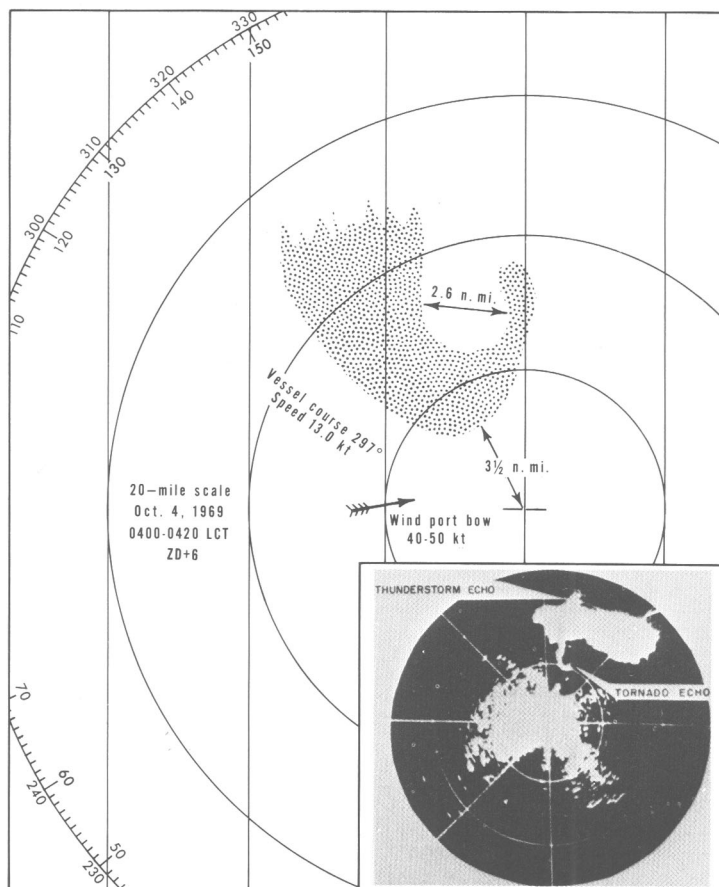


FIGURE 6.—Severe storm echo as sketched by Capt. Dyer from the radarscope on the SS *Inger*. The radar was set on the 2-n.mi. scan, Oct. 4, 1969, at 1000-1020 GMT; range markers are 5 n.mi. The insert, used for comparison, is a classical tornado hook pattern (U.S. Weather Bureau 1967).

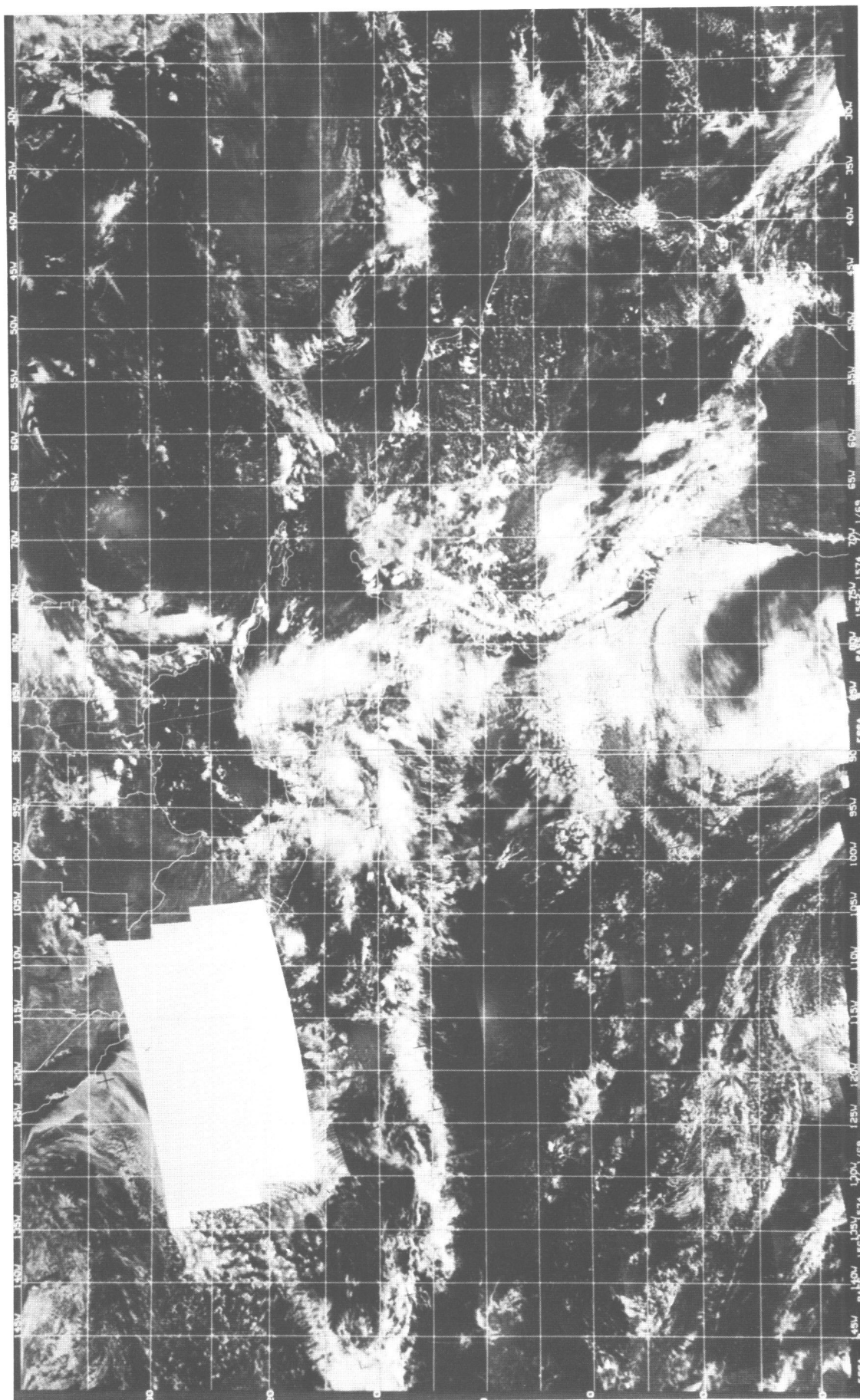


FIGURE 7.—ERSA 9 view at 1826 GMT on July 1, 1969, depicting a cloud mass associated with what was to become tropical storm Ava.

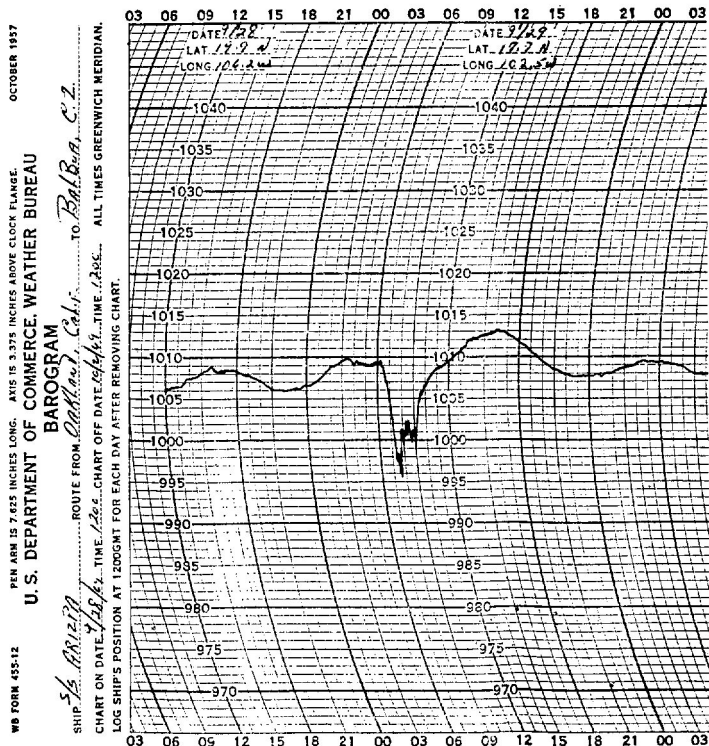


FIGURE 8.—Chart from the SS *Arizpa* indicating a sharp pressure change at 0730 GMT on Sept. 29, 1969.

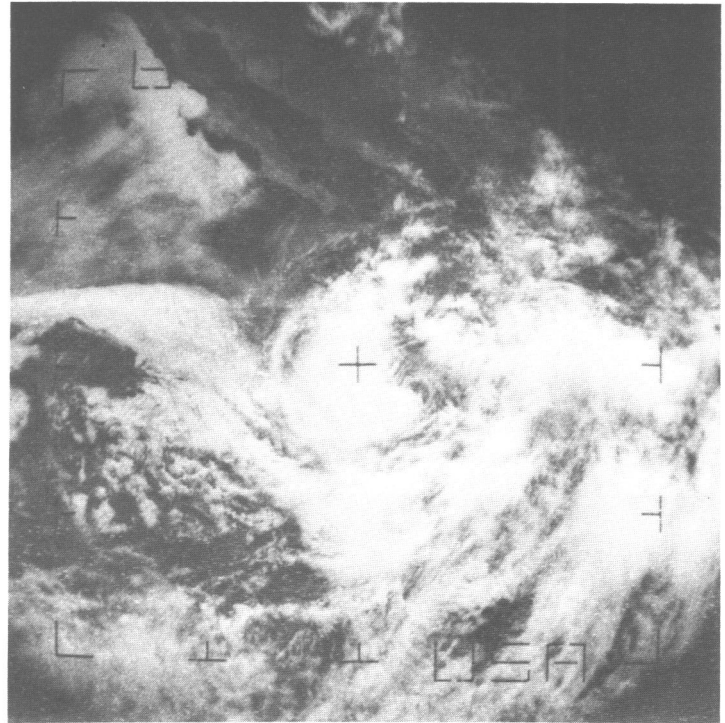


FIGURE 9.—ESSA 8 view of tropical storm Ava on July 4, 1969, with a cirrus outflow to the west and north and a large eye of convective cloud. Maximum winds near the center were estimated at 55 kt.

rising barometer. The lowest pressure was 999.0 mb. Successive satellite pictures on the 2d, 3d, and 4th indicated a movement of 350 mi day⁻¹ for an average speed of about 15 kt to near 16.5° N., 11.5° W., by 2000 GMT on the 5th. The storm then began curving northward and slowed to 3 to 5 kt, intensifying with maximum winds of 55 kt reported by the MV *Ganja* (LAXB) at 0300 GMT on the 5th, about 175 mi south of Socorro Island (fig. 9.)

Ava was downgraded to a tropical depression near Socorro Island, and the last advisory was issued about 1800 GMT on the 7th. A weak circulation moved northward to about 21° N. and then westward to 117° W. by 1725 GMT on the 10th. No further indication of a circulation was apparent on later satellite pictures.

HURRICANE BERNICE, JULY 8-16

A tropical depression developed in an area of showers and squalls between the 8th and 9th about 400 mi southwest of Acapulco. First indications of a circulation were from the MV *Calter Eindhoven* (PDIB) and the MV *Kresbia* (PFLV) at 1800 GMT on the 8th. At 2038 GMT on the 9th, satellite pictures indicated the center was near 11° N., 105° W., and this was verified at 0000 GMT on the 10th by a report from the *Kresbia* at 11.0° N., 106.5° W., with heavy rain. The depression became tropical storm Bernice at 1800 GMT on the 10th, moving west-northwest at 8 kt through the 11th and becoming a hurricane at 14° N., 112° W., at 1800 GMT on the 12th.

Hurricane Bernice moved west-northwest at 12 kt through the 14th, weakening to a tropical storm near 18.0° N., 122.5° W., at 0000 GMT on the 15th, with Air Force reconnaissance estimating winds of 50 kt. The storm then moved more westerly, decreasing to a depression at 0000 GMT on the 16th. Further weakening continued, and the last advisory was issued at 0600 GMT on the 17th. The remaining clouds were still visible in satellite pictures at 19° N., 132° W., at the time of the last advisory.

The NESC assembled satellite pictures to show the life cycle of hurricane Bernice. The storm classifications followed criteria established by the Interdepartmental Committee for Meteorological Services (1969). Bernice passed through all stages of classification, and is a textbook example of an eastern North Pacific storm (fig. 10). The strongest winds and lowest pressures near the storm were observed by the MV *Jersey Bridge* (GRRU), reporting 40-kt winds and a 1004-mb pressure at 0000 GMT on the 12th. Comparable data calculated from satellite pictures were 85 kt and 978 mb at 2110 GMT on the 12th.

TROPICAL STORM CLAUDIA, JULY 21-23

The 1747 GMT satellite picture on July 21 (fig. 11) shows a loosely organized cloud mass centered near 13° N., 130° W., and a tropical depression advisory was issued. No ships reported from the area. It was believed the depression would increase in intensity and move in the

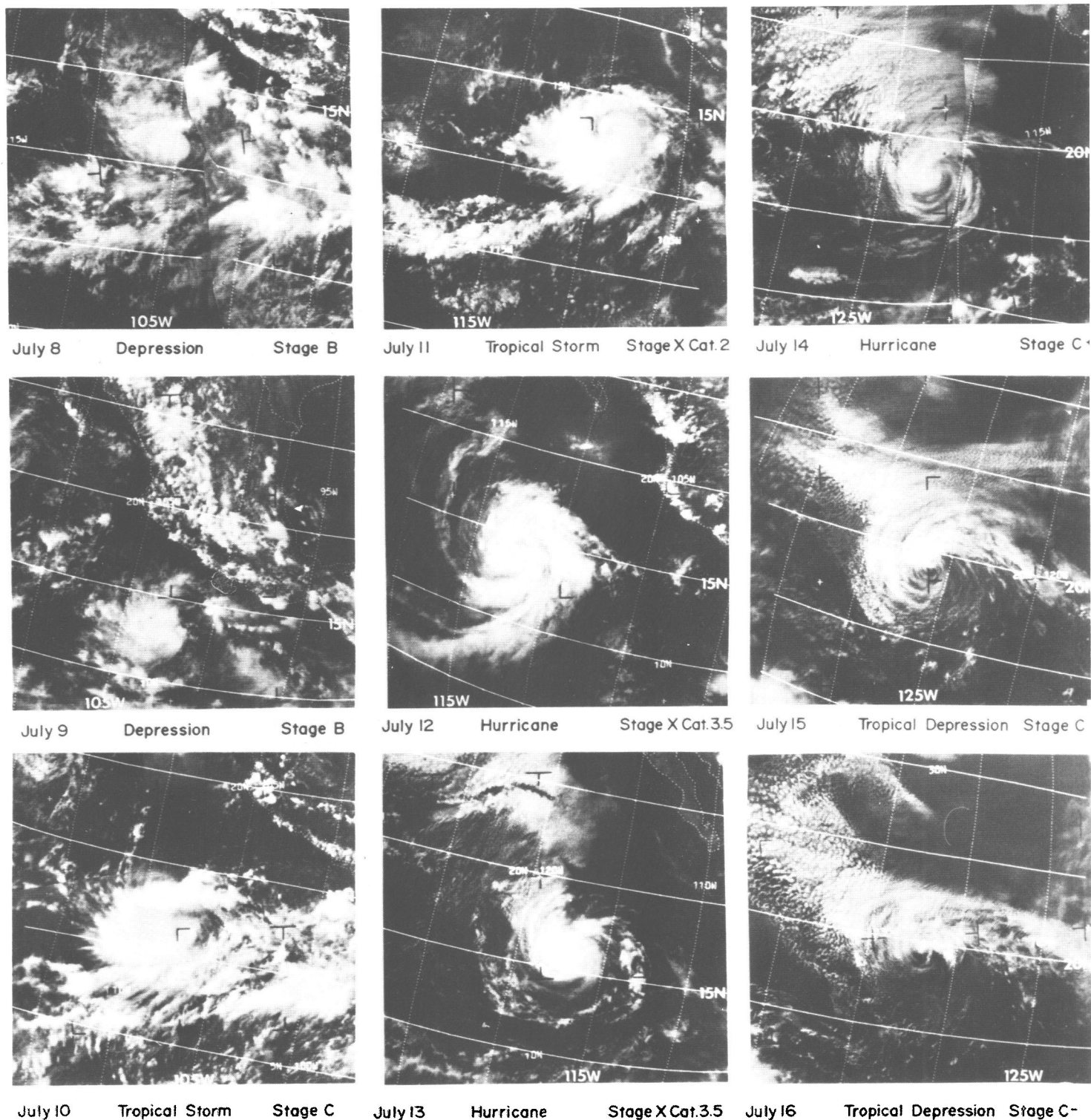


FIGURE 10.—ESSA 9 views of hurricane Bernice on July 8–16, 1969, showing the development and decay of an east Pacific hurricane.

easterlies at about 10 kt. The depression was upgraded to tropical storm Claudia at 0000 GMT on the 22d, and the 1838 GMT picture on the 22d verified that it had intensified and moved to near 16° N., 134° W., about 300 mi in 24 hr. The storm continued through 0000 GMT on the 23d when it was downgraded to a depression moving west-southwest at 15 kt. It dissipated near 15° N., 140° W., at 1800 GMT on the 23d.

The only vessel near the disturbance was the MV *Fernie* (GTLE) at 1800 GMT on the 23d with a 1006.2-mb pressure and an east 20-kt wind estimated about 50 mi from the center.

HURRICANE DOREEN, AUGUST 4–9

Satellite pictures on August 3 indicated a large cloud mass near 16° N., 107° W., on the intertropical convergence zone. No reports from ships were available



FIGURE 11.—ESSA 8 view of tropical depression Claudia developing on July 21, 1969, near 13.0° N., 130.0° W., in an area void of shipping.

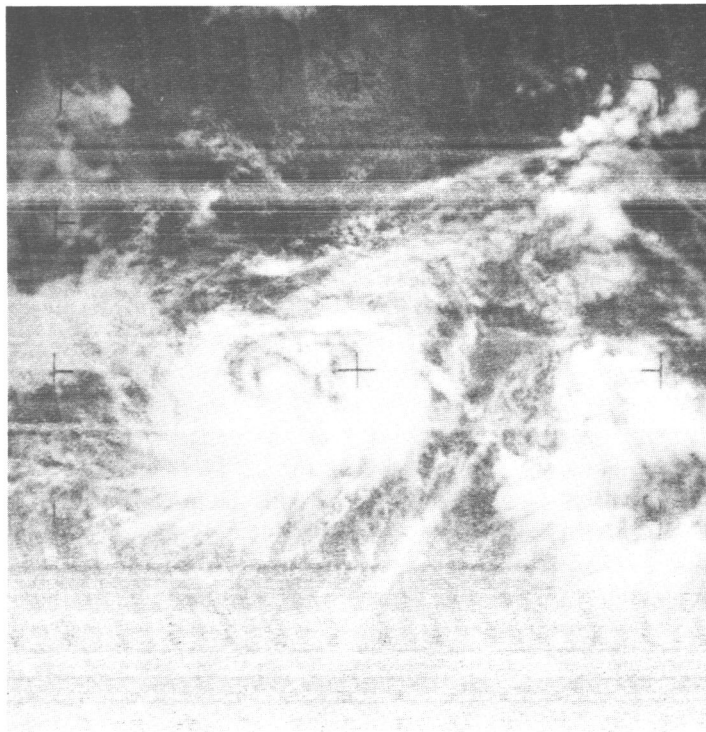


FIGURE 12.—ESSA 8 view of tropical storm Doreen rapidly intensifying and throwing out a "pinwheel" of cirrus on Aug. 4, 1969, near 17.0° N., 107.5° W.

within 200 mi of the mass, but heavy rain was reported along the convergence zone 600 mi west and 300 mi east. By 1620 GMT on the 4th, it was apparent from the large "pinwheel" of cirrus seen in the ESSA 8 photograph (fig. 12) that the depression had intensified to a tropical storm near 17.0° N., 107.5° W., moving northwest at about 8 kt. A southeast wind of 35 kt was reported by the *Shintoku Maru* (JAGM) at 1800 GMT about 100 mi east of the center. The *Shintoku Maru* continued moving with the storm, reporting 40-kt winds and heavy rain at 0600 GMT on the 5th, 45-kt winds at 1200 GMT, and 58-kt winds at 1800 GMT with a 993-mb pressure near the center. The storm was upgraded to a hurricane.

Hurricane Doreen moved west-northwest at 10 kt to near Socorro Island at 0000 GMT on the 6th and to near 21° N., 114° W., at 0000 GMT on the 7th when the eye began to break up and the hurricane downgraded to a tropical storm. Doreen continued west-northwest at 8 kt for 24 hr, becoming a tropical depression moving westward and slowing to 5 kt on the 8th. The depression then moved west-southwest at 8 to 10 kt through 1800 GMT on the 9th when it entered the easterlies and dissipated. A circulation was apparent on the weather maps until 0000 GMT on the 11th near 20° N., 125° W., after which no trace of Doreen could be found.

Reports from the *Shintoku Maru* were most helpful in locating and describing the storm. Beginning at 1800 GMT on the 4th, she sent regular reports while trying to evade the storm and while hove to for 12 hr as Doreen

intensified to a hurricane. As the hurricane moved north-westward, the *Shintoku Maru* headed west, passing about 200 mi south of the center on the 7th and 8th, entering the more normal northeast trades at 0000 GMT on the 10th. Aircraft reconnaissance on the 6th, 7th, and 8th were valuable in estimating the intensity of the storm. Comparisons between reconnaissance wind speeds, San Francisco EPHC bulletin winds, and NESC winds are shown in figure 3.

TROPICAL STORM EMILY, AUGUST 22-24

A low-pressure center over central Mexico on August 20 and 21 developed heavy thunderstorms over the mainland where nine lives were lost and 100,000 people were made homeless in the resulting floods. Showers and squalls were reported between 90° and 105° W. as far south as 9° N. No circulation was apparent in satellite pictures, and ships reported near-normal wind patterns.

At 1200 GMT on the 21st, a circulation was indicated on the weather maps. The center appeared near 14° N., 104° W., but no abnormal winds were suspected. At 1400 GMT on the 22d, the *Kersten Miles* (DAJX) reported a tropical storm at 18.38° N., 104.22° W. The storm was moving 320° at 12 kt with 40- to 45-kt winds. This report was delayed some 5 hr in communications and would have been enough to initiate an advisory. Another delayed observation at 1700 GMT indicated the center near 19.15° N., 105.23° W., moving 330° at 6 kt with 50-kt winds. At 1800 GMT, the center was analyzed near

19.0° N., 106.5° W., from reports from the *Amstelveld* (PCPW) and the *Kersten Miles*, whose wind had quieted to 15 kt.

A report from the *Kamperdyk* (PFGW) at 0000 GMT on the 23d indicated a south 35-kt wind and a 998-mb pressure moving Emily northwest at 12 kt. At 1000 GMT the *Iberville* (KKTH) reported a south 55-kt wind near 21.5° N., 109.0° W. This was apparently the most intense period of the storm. At 1925 GMT on the 23d, Air Force reconnaissance reported a circular eye 20 mi in diameter, locating the center by radar, but was unable to estimate surface winds from the 300-mb flight level. At 2300 GMT, Navy reconnaissance indicated 30-kt winds with remarks transmitted from the vicinity of the center: "Completed low level fix by wind field. Center 22°44'N 112°05'W at 232300 GMT. Center definition good. Definite south and westerly winds observed. Center relatively free of clouds. Slight temperature rise within center. No significant radar echoes. Radar coverage not feasible."

The storm was poorly defined in the northeast quadrant of the ESSA 8 satellite picture (fig. 13) taken at 1715 GMT on the 23d. By 1800 GMT on the 24th, no further indication of the storm could be found in satellite pictures, and shipping indicated no abnormal winds in the area.

TROPICAL STORM FLORENCE, SEPTEMBER 2-7

A low-pressure area, with squalls off the coast of Mexico from the Gulf of Tehuantepec to west of Manzanillo during the latter part of August and early September, developed into a tropical depression near 17° N., 107° W., at 0000 GMT on September 2. The northwest-bound *Furyu Maru* (JFAS) traveled with the Low which by 1800 GMT had moved to the vicinity of Socorro Island. The ship-reported pressure fell to 1006 mb, and the wind with intermittent heavy rain backed to 290° at 25 kt. By 0000 GMT on the 3d, the *Furyu Maru* reported a 320°, 30-kt wind as the depression developed a tighter circulation. The ship then sailed away from the stalling and deepening storm.

The 1700 GMT satellite picture on the 3d showed a typical tropical storm cloud pattern centered at 19.5° N., 110.0° W. Florence moved slowly in a northerly direction, making a tight loop on the 4th and 5th near 21° N., 110° W., and intensifying to near-hurricane strength (fig. 14) with 60-kt winds reported by the *Geneva* (KVBP) and a 992.0-mb pressure by the *Simon Burn* (GJDU). The storm headed north at 5 to 10 kt to 24° N., 112.5° W., at 0000 GMT on the 7th, where, moving over colder water, it weakened to a depression. Dissipation was rapid; and by 0600 GMT on the 7th, it was apparent that winds were not abnormal. Cyclonic cloud patterns continued until the 8th, after which no indication of the storm could be found.

HURRICANE GLENDA, SEPTEMBER 7-12

Hurricane Glenda formed in a mass of clouds off the coast of Mexico about 120 mi south of Acapulco. A large

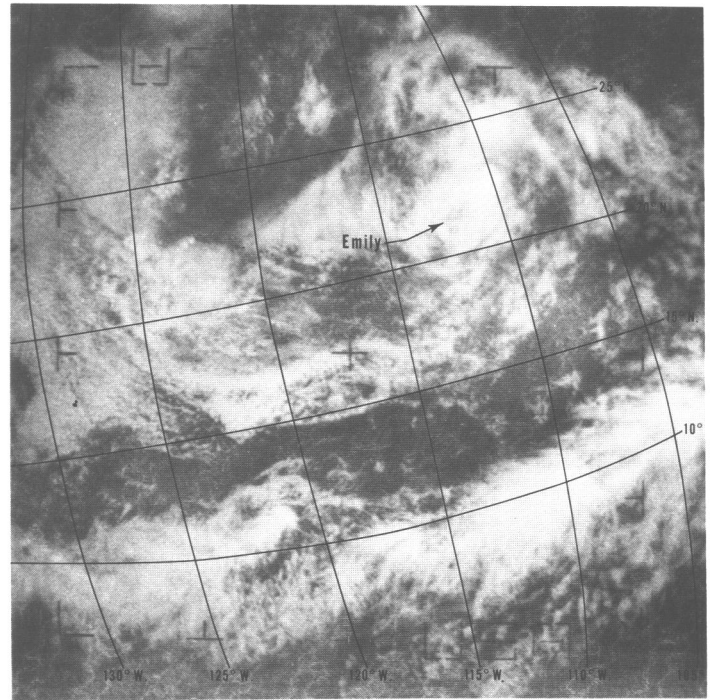


FIGURE 13.—ESSA 8 view of tropical storm Emily at 1715 GMT on Aug. 23, 1969, weakening after generating 55-kt winds at 1000 GMT.

cloud mass west-northwest of the vortex (fig. 15) was a tropical disturbance and failed to develop.

A 2250 GMT, September 7, message received from the *MV Polydoros* (SZOS) read: "Position 15.30N 100.00W wind ENE/8 barometer 997 mbs falling rapidly. Temp 78F Cloudy with heavy showers. Visibility 2 miles but zero in showers."

The cloud mass had been observed the day before, and continuity indicated that the storm was moving northwest at 6 kt and increasing in intensity. At 1800 GMT on September 9, a report from a Navy reconnaissance aircraft indicated the eye was 20 mi in diameter with maximum winds of 55 kt. At 1915 GMT, the Air Force reconnaissance report read: "Wall closed. Strongest in north and south sectors. Heavy cirrus cap 150 miles radius of center extends well above flight level to 40,000 feet. Feeder bands all quadrants heaviest northeast to southwest." At about this time, the ESSA 8 picture (fig. 16) was taken.

The storm became a hurricane briefly during the afternoon and evening of the 9th. It then began to weaken as it continued northwest, approaching the tip of Baja California. The storm turned westward after reaching 26° N., 116° W., at 1800 GMT on the 11th (fig. 17) and dissipated near 25.5° N., 118.0° W., by 0900 GMT on the 12th.

TROPICAL STORM HEATHER, SEPTEMBER 18-25

Tropical storm Heather, first located on satellite pictures, developed in a data-sparse area about 1,000 mi

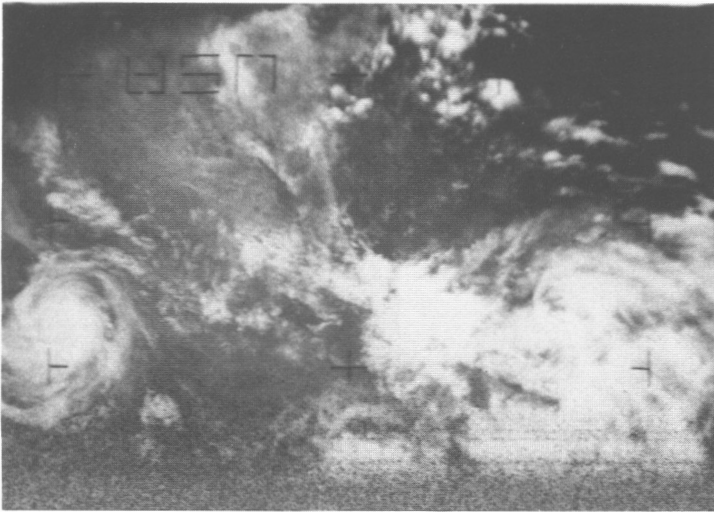


FIGURE 14.—ESSA 8 view of Florence (depicted near the left edge of the picture) at near-hurricane intensity at 1600 GMT on Sept. 4, 1969, south of Baja California. KVBP reported 60-kt winds in the northwest quadrant near the center at 0000 GMT on September 5; U.S. Navy reconnaissance reported maximum winds of 55 kt near the center at 2357 GMT on September 4.

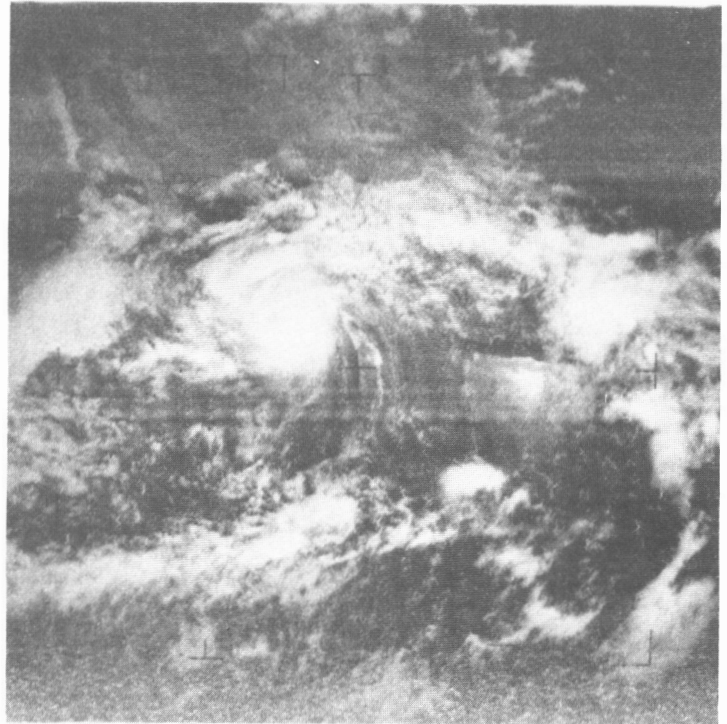


FIGURE 16.—ESSA 8 view of developing tropical storm Glenda at near-hurricane strength at 1626 GMT on Sept. 9, 1969.

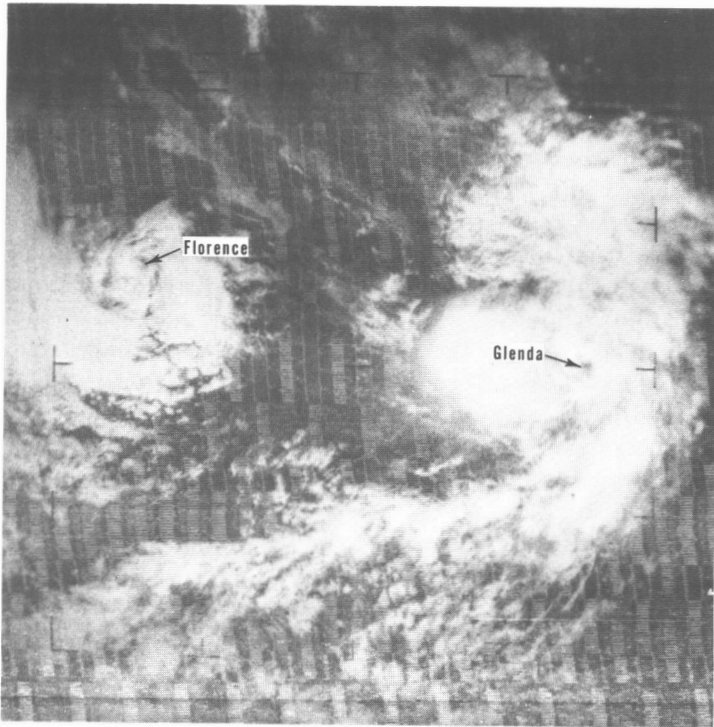


FIGURE 15.—ESSA 8 view on Sept. 7, 1969, depicting the remains of Florence to the west and the developing Glenda to the east.

southwest of La Paz, Baja California, on the 18th. Due to the lack of shipping in the area, the best positions were obtained by daily satellite observations and by Air Force reconnaissance on the 20th and 21st.

From its area of development near 14.5° N., 122.0° W., at 1800 GMT on the 18th, the storm moved west-northwest

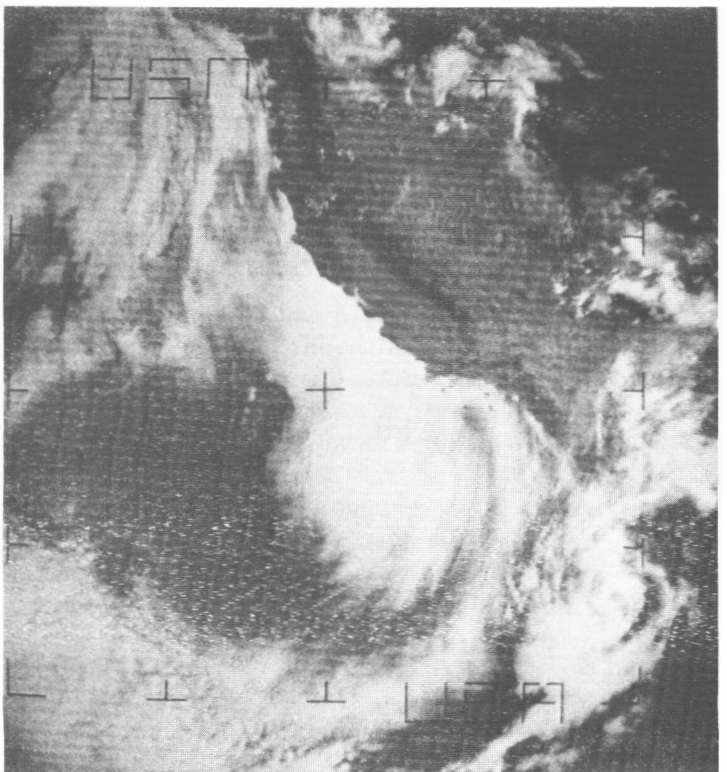


FIGURE 17.—ESSA 8 view of dissipating Glenda with 40-kt winds reported by U.S. Navy reconnaissance at 1803 GMT on September 11.

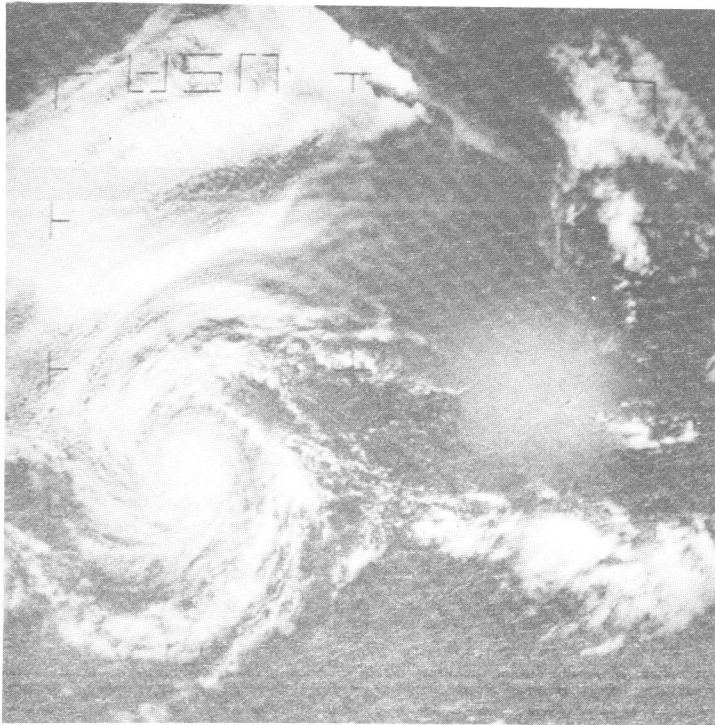


FIGURE 18.—ESSA 8 view of vicious-looking hurricane Heather at 1719 GMT on Sept. 19, 1969. Maximum sustained winds were kept to 55 kt because of apparent cool air inflow.

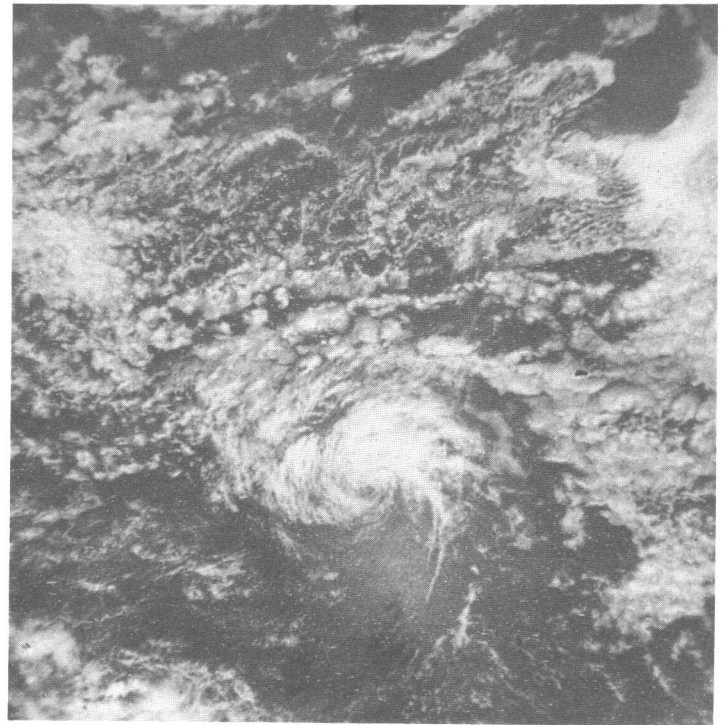


FIGURE 19.—Nimbus III view of tropical depression Heather on Sept. 23, 1969.

at 7 kt through the 21st. It was classified a depression and slowed to 2 to 5 kt through the 23d when it accelerated slightly, reaching a point near 21° N., 134° W., at 0000 GMT on the 25th. It then moved more westward and dissipated by 1800 GMT.

Figure 18 shows Heather at near-hurricane intensity on the 19th. Heather was classified a depression (fig. 19) on the 23d, but might still have been a tropical storm from ATS I information supplied by the NESC.

TROPICAL STORM IRAH, SEPTEMBER 30–OCTOBER 3

Satellite pictures on the 28th and 29th were indicative of a cyclonic circulation on the intertropical convergence zone, but details were lacking due to local radio interference and low angle until a mosaic was received on the facsimile circuit (fig. 20), followed by a bulletin from the NESC between 0400 and 0600 GMT on October 1.

Local pictures (fig. 21) suggested a tropical depression near 16° N., 112° W., at 1700 GMT on September 30. The depression was upgraded to a tropical storm on receipt of the NESC information. The storm moved west-northwest at 5 kt through 1200 GMT on the 1st. It curved northward and slowed, moving 1° in the following 24 hr, and weakened to a depression near 17.5° N., 115.0° W. The depression moved to the east and dissipated into an area of squalls near 17.5° N., 114.0° W., at 1800 GMT on the 3d.

Aircraft reconnaissance observers indicated 35-kt surface winds, as the storm curved northward on the 1st; but on returning to Point Mugu from Acapulco the next day, they were unable to discern a center on radar or from the wind field.

HURRICANE JENNIFER, OCTOBER 8–12

Squalls south of the Gulf of Tehuantepec on October 6 developed into a tropical disturbance on the intertropical convergence zone at about 12° N. No ship reports were received that indicated a tropical cyclone, but numerous 25-kt winds and showers were reported between Salina Cruz and Acapulco.

At 0055 GMT on the 8th, the following message was relayed to the Weather Bureau: "German *M/T BISCAYA* to hydrographer 7th 1900Z position 13.5° N 101.9° W barometer 1003 mb 26 centigrade wind NNW 2 to 3 sea one overcast medium to strong showers completely overcast stop. Last hour rain stopped wind shifted to north up to force 6 rather quick barometer dropped to 995 mb 25 centigrade sea 3 still overcast." About 3 hr later, satellite pictures showed the disturbance centered at 14° N., 100° W., indicating it had moved westward. At 1500 GMT on the 8th, the USCG cutter *Chase* reported northwest 40-kt winds; it was believed that tropical storm Jennifer had developed near 14.0° N., 102.5° W. The wind on the *Chase* backed to 240° at 35 kt 3 hr later, as both the cutter and the storm moved west, the storm slightly faster than the *Chase*. At 0000 GMT on the 9th, the *Chase* reported 45-kt winds as the storm intensified, moving to 14.8° N., 104.6° W., curving northwestward and developing into a hurricane by 1800 GMT near 17.0° N., 107.5° W.

Jennifer, about 200 mi off shore, moved northwest at 6 kt, following a course that paralleled the coast to about 20° N. at 0000 GMT on the 11th. The hurricane then curved northeast, picking up speed to 10 kt, to a point about 60 mi west of Mazatlan at 1800 GMT on the 12th and on-

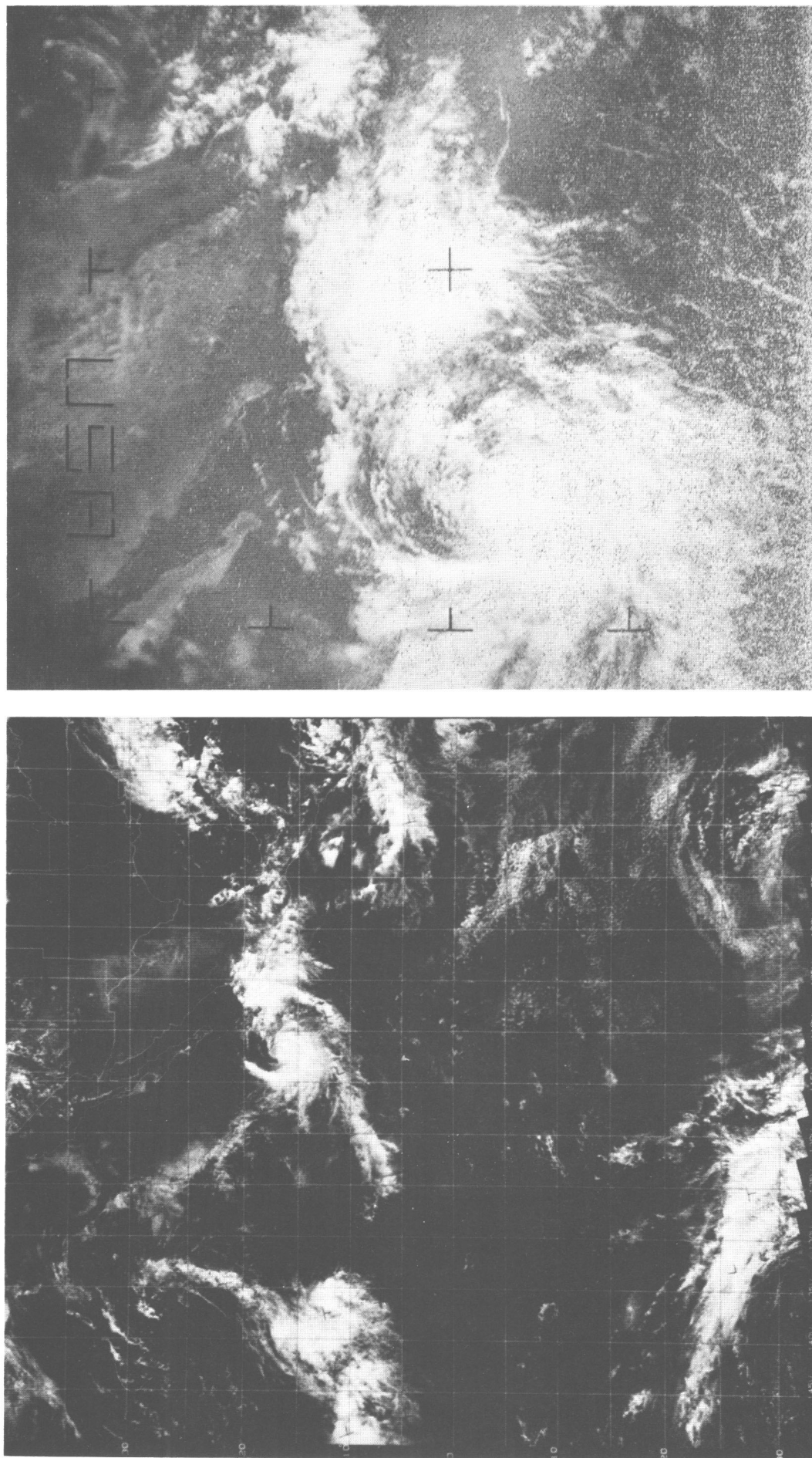


FIGURE 20.—Tropical storm Irah on Sept. 29, 1969. Occasionally more detailed information was obtainable from National Facsimile Circuits (mosaic at left) than from locally obtained APT pictures.

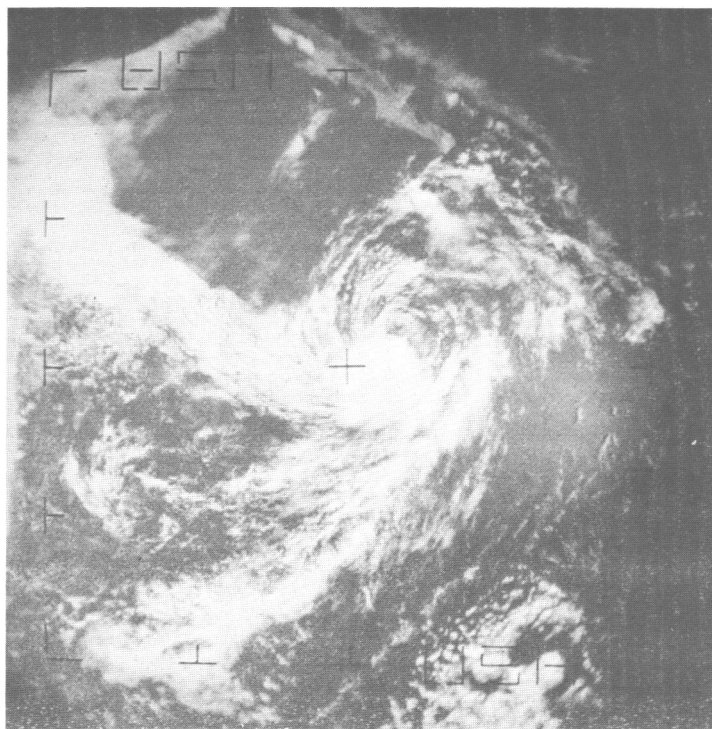


FIGURE 21.—ESSA 8 view of a cirrus cap removed from the convective chimney of tropical depression Irah (17.0° N., 113.5° W.) on Sept. 30, 1969.

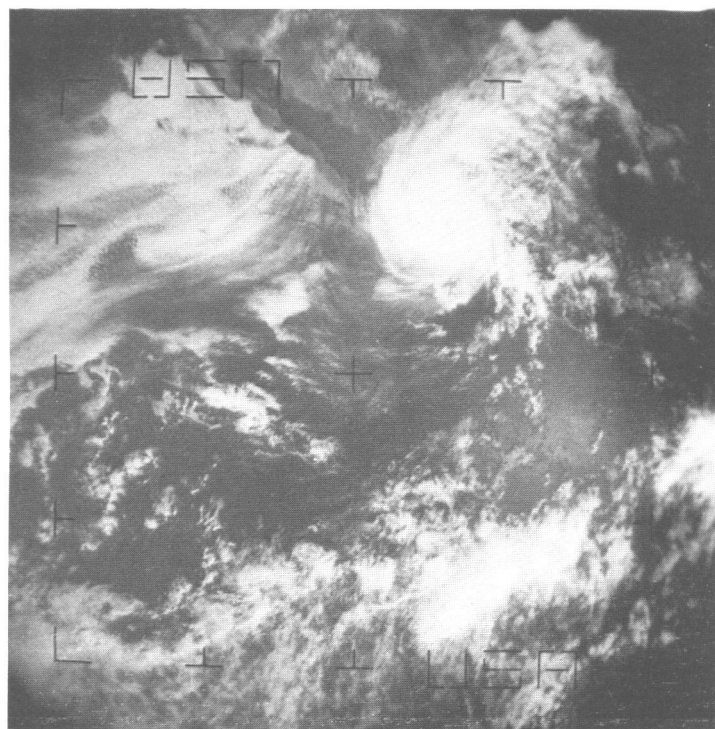


FIGURE 22.—ESSA 8 view of Jennifer, a mature hurricane, heading for the coast of Mexico north of Mazatlan on Oct. 11, 1969.

shore about 40 mi northwest of Matzalan at 0000 GMT on the 13th. The following is the Air Force post-flight summary by Prentice (1969) describing Jennifer (fig. 22):

"Lark 03 JENNIFER was fixed by radar at 111800Z. The storm had changed considerably since observer had made 091800Z fix. The eye is now concentric being distinguished by many short—60NM—feeder bands surrounding the eye leaving a 30NM open center. These lines radiated out to a diameter of 65NM with scattered Cb outside the 70NM radius of the center. Due to dropsonde equipment malfunction penetration was not attempted as the feeder bands merged with the lowering cirrus and would have been difficult to weave around the lines and could have put us too close to land. The weakest quadrant appeared to be in the southeast. A complete cirrus deck shields the entire area. The surface was visible briefly when at 220 degrees 70NM from the center and winds were estimated at 45 kts."

REFERENCES

- Denney, William J., "The Eastern Pacific Hurricane Season of 1968," *Monthly Weather Review*, Vol. 97, No. 3, Mar. 1969, pp. 207–224.
- Dyer, L. J., "Tropical Disturbance Detected by the INGER," *Mariners Weather Log*, Vol. 14, No. 1, Jan. 1970, p. 27.
- Fletcher, Robert D., "Computation of Maximum Surface Winds in Hurricanes," *Bulletin of the American Meteorological Society*, Vol. 36, No. 6, June 1955, pp. 247–250.
- Interdepartmental Committee for Meteorological Services, *Subcommittee on Basic Meteorological Services National Hurricane Operations Plan*, Washington, D.C., Apr. 1969, 84 pp. (see pp. 80–81).
- Prentice, M. G., "Air Force Post-Flight Summary, Lark 3, Jennifer," 55th Weather Reconnaissance Squadron, McClellan Air Force Base, Calif., Oct. 1969, 1 p.
- Rosendal, Hans E., "Eastern North Pacific Tropical Cyclones 1947–1961," *Mariners Weather Log*, Vol. 6, No. 6, Nov. 1962, pp. 195–201.
- Sadler, James C., "Tropical Cyclones of the Eastern North Pacific as Revealed by TIROS Observations," *Scientific Report No. 4*, Contract No. AF19(604)–6156, Hawaii Institute of Geophysics, University of Hawaii, Honolulu, May 1963, 39 pp.
- Timchalk, A., Hubert, L. F., and Fritz, S., "Wind Speeds From TIROS Pictures of Storms in the Tropics," *Meteorological Satellite Laboratory Report No. 33*, U.S. Weather Bureau, Washington, D.C., Feb. 1965, 33 pp.
- U.S. Weather Bureau, ESSA, "Uses of Radar in Synoptic Meteorology," *Weather Radar Manual (WBAN)*, Part B, Washington, D.C., 1967, pp. 5-1–5-50, (see p. 5-18).
- U.S. Coast Guard, *Department of Transportation List of Merchant Vessels With SAR Data*, CG-317, Washington, D.C., Oct. 1969, 80 pp., (see chart, obverse D. AMVER 5).

[Received January 14, 1970]